The percutaneous closure of a large pseudoaneurysm of the ascending aorta with an atrial septal defect Amplatzer occluder: Two-year follow-up

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Pseudoaneurysm of the ascending aorta is a high-risk complication following cardiac surgery. The present report describes excellent two-year follow-up results after the percutaneous closure of a very large pseudoaneurysm with an Amplatzer atrial septal defect occluder. The original cavity in the anterior mediastinum with maximal diameter 15 cm remained as only a small scar. The patient was without serious health problems both early and after two years.

Key Words: Amplatzer ASD occluder; Ascending aorta; Percutaneous closure; Pseudoaneurysm

Pseudoaneurysm of the ascending aorta is a high-risk complication following thoracic surgery. Surgical repair is the conventional treatment but it is associated with a very poor prognosis, mortality can reach up to 30% and, in some cases, surgical repair is not possible. Some novel approaches have been presented but experiences with these procedures are relative low. We report excellent two-year follow-up results after the percutaneous closure of a very large pseudoaneurysm of an ascending aorta using an Amplatzer atrial septal defect (ASD) occluder (AGA Medical Corporation, USA).

CASE PRESENTATION

A 51-year-old man with a history of moderate combined aortic valve disease was admitted in April 2005 with symptoms of cardiac failure caused by infective endocarditis. The patient underwent four weeks of standard antibiotic therapy, which was followed by aortic valve replacement with a mechanical Edwards 25 mm valve (Edwards Lifesciences LLC, USA). Because of coronary atherosclerosis, bypass of the left internal mammary artery to the left anterior descending artery, and venous graft to a marginal branch were performed. The operation proceeded without complications and the patient was placed on antibiotic therapy for more than five weeks. All symptoms of inflammation subsided and the last transthoracic echocardiography showed a normal function of the prosthetic valve. During a standard clinical checkup three months after the patient was discharged, a transesophageal echocardiography documented a pseudoaneurysm of the ascending aorta (100 mm × 80 mm × 70 mm) originating 40 mm up to the aortic

La fermeture percutanée d'un gros pseudoanévrisme de l'aorte ascendante au moyen d'un dispositif Amplatzer d'occlusion de communication interauriculaire : Un suivi de deux ans

Le pseudoanévrisme de l'aorte ascendante est une complication à haut risque après une chirurgie cardiaque. Le présent rapport décrit d'excellents résultats après un suivi de deux ans suivant la fermeture percutanée d'un très gros pseudoanévrisme, au moyen d'un dispositif Amplatzer d'occlusion de communication interauriculaire. La cavité originale située dans le médiastin antérieur, d'un diamètre maximal de 15 cm, a laissé place à une petite cicatrice. Le patient n'a présenté aucun problème de santé grave, tant peu après l'intervention que deux ans plus tard.

valve, and the defect in the aortic wall was measured to be 7 mm. The pseudoaneurysm compressed the outflow tract of the right ventricle (the pulmonary artery diameter was 8 mm, mean gradient 30 mmHg). Magnetic resonance imaging confirmed the diagnosis (Figure 1). There was no evidence of clinical or laboratory symptoms of inflammation. A series of ultrasounds over a period of 10 days showed progression of the pseudoaneurysm, with its maximal diameter increasing up to 150 mm and the aortic defect enlarged up to 12 mm × 14 mm. An ASD type of Amplatzer occluder was used to treat the pseudoaneurysm. A specially modified standard 8 Fr 90 cm sheath with a hockey stick 8 Fr coronary guiding catheter (Cordis Corporation, USA) was passed through the defect into the cavity of the pseudoaneurysm (Figure 2). A 15 mm ASD type of Amplatzer occluder was successfully implanted (Figure 3). The procedure was performed under standard fluoroscopy and transesophageal echocardiography guidance. A small residual leak remained after the procedure, but over two weeks, the pseudoaneurysm became thrombosed, the defect sealed completely and the occluder remained stable. The size of the pseudoaneurysm gradually decreased and the compression of the pulmonary artery diminished. Five months later, magnetic resonance imaging and transthoracic echocardiography showed a thrombosed residual pseudoaneurysm (82 mm × 44 mm × 42 mm) with a central colligation (Figure 4). One year following the procedure, a spherical scar remained (55 mm × 42 mm × 35 mm) (Figure 5). After two years, only an irregular small scar was seen (Figure 6). The procedure was completely without complications and was well tolerated by the patient.

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Figure 1) Cardiac pretreatment magnetic resonance imaging. **A** Sagittal view. **B** Sagittal view of compression of the right ventricle outflow tract. Ao Aorta; E Entry; LV Left ventricle; PA Pulmonary artery; PS Large pseudoaneurysm; RV Right ventricle

Figure 2) A specially modified standard 8 Fr 90 cm sheath with hockey stick 8 Fr coronary guiding catheter

Figure 3) Angiography in lateral view. **A** Pretreatment angiography. **B** Angiography immediately after implantation of 15 mm atrial septal defect (ASD) Amplatzer occluder (AGA Medical Corporation, USA). Ao Aorta; PS Large pseudoaneurysm

Furthermore, the patient had no serious health problems and enjoyed a good quality of life over two years of follow-up.

DISCUSSION

Pseudoaneurysm of the ascending aorta is a relatively rare but exceptionally serious complication following thoracic surgery, trauma or some other affliction of the chest. Surgical repair is the most common treatment but this procedure is associated with a very high mortality and morbidity, and sometimes, surgical repair is not practically possible (1). In the past, a few percutaneous techniques have been applied such as stentgraft, coil implantation (2) or thrombin for the closing (3) of a pseudoaneurysm. The final effects obtained from these techniques were not optimal and adequate experience is lacking. Different types of Amplatzer occluders have been used occasionally in 'off label' indications for the occlusion of rare defects. Some authors (4,5) demonstrated promising immediate effects of treating a

Figure 4) Cardiac magnetic resonance image – sagittal view, five-month follow-up. ASD Amplatzer atrial septal defect occluder (AGA Medical Corporation, USA); Ao Aorta; PS Residual pseudoaneurysm

Figure 5) Cardiac magnetic resonance image – sagittal view, one-year follow-up. Ao Aorta; ASD Amplatzer atrial septal defect occluder (AGA Medical Corporation, USA); RS Residual scar

pseudoaneurysm of the ascending aorta using an Amplatzer occluder. However, long-term follow-up experiences have not been described. In the present paper, we demonstrate not only the immediate success of using an Amplatzer occluder in the treatment of a large pseudoaneurysm of the ascending aorta but, moreover, the excellent effect of this procedure during more than two years of follow-up. In our opinion, and from previous experiences described in the literature, the use of an Amplatzer occluder to treat a pseudoaneurysm of the ascending aorta may be a good choice for patients with a proper anatomy (sufficient rim of the defect, sufficient distance from vital structures, etc) and without signs of infection. This procedure can be relatively 'simple' for the operator (in catheterization laboratories with vast experience) and relatively safe for patients, but further experience is required.

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Figure 6) Cardiac magnetic resonance image – sagittal view, two-year follow-up. Ao Aorta; ASD Amplatzer atrial septal defect occluder (AGA Medical Corporation, USA); RS Residual scar